Assignment 3

Textbook Assignment: "Fluid Lines and Fittings," chapter 5, pages 5-11 through 5-21; "Valves," chapter 6; and Sealing Devices and Materials," chapter 7.

Learning Objective: Recognize uses, construction features, operational characteristics and procedures, functions, and precautionary measures associated with fluid power system connectors.

QUESTIONS 3-1 THROUGH 3-4 CONCERN THE USE OF THREADED CONNECTORS IN FLUID POWER CIRCULATORY SYSTEMS.

3-1. The threads of newly threaded pipe do not corrode if the fittings cover all of the exposed threading.

1. True
2. False

3-2. Pipe compounds prevent corrosion and assist in the disassembly of threaded joints.

1. True
2. False

3-3. Excess pipe compound that may ooze inside lines does not present problems if the compound is compatible with the fluid in the system.

1. True
2. False

3-4. The use of threaded connectors is generally limited to low-pressure systems.

1. True
2. False

IN ANSWERING QUESTIONS 3-5 THROUGH 3-7, SELECT FROM COLUMN B THE TYPE OF CONNECTOR TO WHICH EACH STATEMENT IN COLUMN A APPLIES. NOT EVERY CONNECTOR IN COLUMN B IS USED.

	A. STATEMENTS	B. CONNECTORS
3-5.	This connector is attached to the piping by welding, brazing, tapered thread , or rolling and bending	1. Brazed 2. Flared 3. Welded 4. Flange
3-6.	This connector connects sub-assemblies in some fluid power systems, especially in high--pressure systems that use pipe for the fluid lines	
3-7.	This connector is commonly used for joining nonferrous piping in the pressure and temperature range where its use is practical	

3-8. The fitting of a flared connector should be made of material having greater strength than that of its sleeve and nut and of the piping.

1. True
2. False

3-9. A universal fitting is one that can be

1. positioned to the angle required for the installation
2. adapted to operate with any size tubing
3. positioned to any angle in any plane
4. routed through a bulkhead

IN QUESTIONS 3-10 THROUGH 3-13, SELECT FROM COLUMN B THE CONNECTOR TO WHICH EACH STATEMENT CONCERNING TIGHTENING DATA IN COLUMN A APPLIES.

A. TIGHTENING DATA	B. CONNECTORS
3-10. This connector tightened 1/6 turn past the specified torque	1. Flareless type
3-11. This connector may not be tightened past the specified torque	2. Aluminum alloy flared type
3-12. This connector must be preset prior to being tightened	3. Steel flared type
3-13. This connector must be turned with a wrench 1/6 turn past handtight	

3-14. Quick-disconnect couplings are provided with an automatic shutoff feature which prevents loss of fluid from the system or entrance of foreign matter into the system when they are disconnected.

1. True
2. False

3-15. Manifolds are used in the pressure supply and/or return lines of fluid power systems to perform which of the following functions?

1. Conserve space
2. Reduce joints
3. Eliminate piping
4. All of the above

3-16. In long pieces of tubing or pieces bent to a complex shape, rust and scale can be removed by what process?

1. Degaussing
2. Pickling
3. Scraping
4. Sandblasting

Learning Objective: Identify functions of valves in a fluid power system; also recognize functions, operating characteristics, and construction features of various types of flow control valves.

3-17. Valves are used to control which of the following in fluid power systems?

1. Direction of fluid flow
2. Fluid pressure
3. Fluid flow
4. All of the above

IN ANSWERING QUESTIONS 3-18 THROUGH 3-20, SELECT FROM COLUMN B THE TYPE OF FLOW CONTROL VALVE MOST CLOSELY IDENTIFIED WITH EACH STATEMENT IN COLUMN A.

A. STATEMENTS	B. TYPES
3-18. Its flow is controlled by raising or lowering discs or wedges	1. Ball
3-19. Flow or no-flow through it is controlled by turning the valve shaft one-quarter turn	2. Gate
3-20. Certain types are used as variable restrictors	3. Globe
	4. Needle

3-21. Gate valves are suitable for use as throttling valves because they close in small increments.

1. True
2. False

3-22. The globe valve gets its name from the globular shape of its body, a shape that is unique to this valve.

1. True
2. False

3-23. Approximately how far must the handwheel of a globe valve be turned toward the closed position after the valve has been fully opened?

1. 1/4 turn
2. 1/2 turn
3. 3/4 turn
4. 7/8 turn

3-24. What type of flow control valve makes the most suitable throttle valve?

1. Gate
2. Plug
3. Globe
4. Needle

Learning Objective: Relate the operation, functions, requirements, and construction characteristics of pressure control devices to fluid power systems.

3-25. Relief valves are used for which of the following functions?

1. To maintain pressures above a predetermined level
2. To maintain fluid flow below a predetermined rate
3. To prevent pressure from rising above a predetermined level
4. To prevent thermal expansion of the fluids

3-26. If a fluid power system uses two or more relief valves, they must all be the same size.

1. True
2. False

3-27. Chatter in a relief valve is the result of

1. rapid opening and closing of the valve as it 'hunts' above and below a set pressure
2. too much difference between opening and closing pressures of the valve
3. concurrent operation of the small relief valve and the main relief valve
4. improper seating of the valve element

REFER TO FIGURE 6-13 IN YOUR TEXTBOOK IN ANSWERING QUESTIONS 3-28 AND 3-29 CONCERNING THE OPERATION OF A COMPOUND RELIEF VALVE.

3-28. When the system pressure increases above the pressure to which the valve is set, the main valve opens

1. independently of the pilot valve
2. only after the system pressure increases to more than can be relieved by the pilot valve
3. concurrently with the pilot valve
4. every time the pilot valve opens but at a predetermined time interval afterward

3-29. After the main valve has relieved the system and when pressure returns to normal, what does the pilot valve do?

1. It remains open until after the main valve closes
2. It closes simultaneously with the main valve
3. It closes first and allows pressure to equalize above and below the main piston
4. It closes first and causes pressure above the main piston to force the main valve closed

3-30. A hydraulic pressure regulator does which of the following?

1. Maintains the system pressure between two predetermined levels
2. Regulates the quantity of fluid flow in the system
3. Maintains the system pressure above a predetermined pressure level
4. Maintains the system pressure below a predetermined pressure level

3-31. Chatter of a pressure regulator may be prevented by

1. using a constant displacement pump
2. installing a snubber in the fluid supply line
3. maintaining a very small differential pressure
4. making cutout (closing) pressure higher than cutin (opening) pressure

REFER TO FIGURE 6-14 IN YOUR TEXTBOOK IN ANSWERING QUESTIONS 3-32 AND 3-33.

3-32. What is the operational state of the regulator when the system pressure is less than that required to operate one of the activating units in the system?

1. The pilot valve is seated, the check valve is unseated, and fluid is flowing into the system
2. The pilot valve is unseated, the check valve is seated, and fluid is flowing into the system
3. The check valve is unseated, the pilot valve is seated, and fluid is flowing into the return line
4. The check valve is unseated, the pilot valve is unseated, and fluid is flowing into the system and into the return line

3-33. For the pressure-controlled sequence valve to operate properly, the tension of the spring must be sufficient to hold the piston in the closed position against pressure required to operate the primary unit.

1. True
2. False

3-34. Refer to figure 6–17 in your textbook. Under what condition does the valve operate as a conventional check valve?

1. Any time pressure in port A is greater than the pressure in port B
2. Any time the pressures in port A and port B are equal
3. Only when the plunger is depressed
4. Only when the plunger is released

3-35. Refer to figure 6-18 in your textbook. The valve decreases fluid flow when which of the following conditions exist(s)?

1. The pressure in the outlet port exceeds the adjusting spring pressure
2. The pressure in the inlet port exceeds the pressure desired in the outlet port
3. The pressure on the valve diaphragm moves the valve stem up to close the valve
4. All of the above

REFER TO FIGURE 6-19 IN YOUR TEXTBOOK IN ANSWERING QUESTIONS 3-36 AND 3-37.

3-36. If the input pressure of the inlet port is less than the setting of the pressure reducing valve, what should be the respective positions of the poppet valve and the spool valve?

1. Open, open
2. Open, closed
3. Closed, closed
4. Closed, open

3-37. A restriction in the drain would cause the outlet port pressure to

1. pulsate
2. increase
3. decrease
4. remain the same

3-38. The following statements concern the operation of the counterbalance valve shown in figure 6-20 of your textbook. Mark each statement true of false, then select the alternative below that lists those that are true.

A. The main valve has equal surfaces which are the inner areas of the spool.
B. The activation of the valve results from the applied pressure opening the check valve, allowing the fluid to bypass the main valve.
C. Reverse action of the valve is controlled by the pressure required to overcome the spring tension of a check valve.
D. The weight supported by the valve depends upon the spring tension on the spool.

1. A, B, C
2. A, C, D
3. B, C, D
4. A, D

Learning Objective: Recognize construction features, operating characteristics, and uses of various types of directional control valves.

3-39. A poppet is used as the valving element for which of the following fluid power valve applications?

1. Flow control
2. Pressure control
3. Directional control
4. All of the above

3-40. What type of valving element is most commonly used in directional control applications?

1. Ball
2. Poppet
3. Rotary spool
4. Sliding spool

3-41. Check valves usually contain what types of valving elements?

1. Ball and cone
2. Ball and poppet
3. Sleeve and poppet
4. Rotary spool and sliding spool

3-42. What type of check valve permits free flow of fluid in one direction and a limited flow of fluid in the opposite direction?

1. Orifice
2. Vertical
3. Swing
4. Ball

3-43. Refer to figure 6-25 in your textbook. Force caused by which of the following plays no part in the opening and closing of this valve?

1. Gravity
2. Spring action
3. Backflow of fluid
4. Forward flow of fluid

3-44. Refer to figure 6-27 in your textbook. If normal system inlet pressure is lost, when the alternate system is activated, its pressure will cause the shuttle to move sufficiently to

1. close the outlet port to prevent reverse flow from the outlet port to the normal system inlet
2. close the outlet port and connect the normal system inlet to the alternate system inlet
3. apply the alternate system pressure to both the outlet port and the normal system
4. close the normal system inlet to prevent loss of alternate system pressure

3-45. Refer to figure 6-28 in your textbook. Which statement relative to the operation of this valve is false?

1. The upper poppet is controlled by the inside cam
2. Fluid flow to the return line is controlled by the lower poppet
3. Fluid flow from the pressure line is controlled by the upper poppet
4. The lower poppet is unseated by the outside cam to allow the fluid to flow into the cylinder and actuate the piston

3-46. When the pilot chamber of the three-way, poppet-type, normally closed directional control valve is pressurized, fluid flows from the actuating cylinder through the valve and out the exhaust port .

1. True
2. False

3-47. Which four-way valves are actuated by cams?

1. Rotary spool
2. Poppet
3. Sliding spool
4. All of the above

3-48. Which type of valve is considered most trouble free of all four-way valves?

1. Poppet
2. Rotary spool
3. Sliding spool
4. Cam operated

3-49. Which of the following represents the flow of fluid as illustrated in figure 6-34, view B in your textbook?

1. P → sleeve → C1; C2 → sleeve → R
2. P → sleeve → C2; C1 → sleeve → R
3. R → sleeve → C2; C1 → sleeve → P
4. R → sleeve → C1; C2 → sleeve → P

Learning Objective: Recognize required characteristics, functions, types, and materials of sealing devices used in fluid power systems.

3-50. Suitable packing devices for fluid power systems are made from materials that possess which of the following characteristics?

1. Compatibility with fluids used in the systems
2. Effective sealing ability
3. Durability
4. All of the above

3-51. The term “sealing devices” is a classification applicable to packing materials used to provide an effective seal between which of the following parts?

1. Two moving parts
2. Two stationary parts
3. A moving part and a stationary part
4. All of the above parts combinations

3-52. No internal leakage should be allowed to occur within a hydraulic power system because of the resulting loss in system efficiency.

1. True
2. False

3-53. Which of the following factors is/are used in determining the material used as a sealing device for a particular application?

1. Location of the seal
2. Storage of the seal
3. Both 1 and 2 above
4. Type of motion

3-54. Cork is suitable for use as gaskets because of which of the following characteristics?

1. Its resiliency
2. Its flexibility
3. Its compressibility
4. All of the above

3-55. You are reassembling a vital component which uses a copper sealing ring and discover there is not a new replacement ring. Which, if any, of the following steps should you take?

1. Reinstall the old ring after inspecting it for damage
2. Install an O-ring that is compatible with the fluid used in the system
3. Reinstall the old ring after it has been annealed
4. None of the above

3-56. Although it has many of the characteristics required in an effective seal , which of the following materials is not used as packing material in a system in which petroleum-base fluid is used?

1. Cork
2. Asbestos
3. Natural rubber
4. Synthetic rubber

Learning Objective: Recognize functions, identification procedures, inspection and installation techniques, and characteristics of various types of seals.

3-57. Which of the following statements is NOT true of T-seals?

1. T-seals provide a positive seal at low pressure
2. There is no military standard part numbering system to identify T-seals
3. The dash (-) numbers used to identify the size of T-seals are part of a preliminary numbering system
4. The Navy has created a numbering system to identify T-seals for hydraulic actuators

3-50. To obtain the correct squeeze or clearance on V-ring packing, shims or spacers are used to adjust the packing gland depth.

1. True
2. False

3-59. Regardless of its condition, an O-ring must be discarded if it cannot be positively identified.

1. True
2. False

3-60. Which of the following items can be used to identify replacement O-rings?

1. Allowance parts lists (APLs)
2. Technical manuals
3. System drawings
4. All of the above

3-61. What is the basis for computing the age of an O-ring’?

1. Service life
2. The cure date
3. Replacement schedule
4. Operational conditions

3-62. What is the expiration date of an O-ring which was cured on 13 July 1990 and has a 4-year shelf life?

1. 30 September 1994
2. 31 August 1994
3. 31 July 1994
4. 13 July 1994

3-63. Which of the following materials should NOT be used to fabricate tools for use in removing and installing O-ring and backup rings?

1. Wood
2. Steel
3. Brass
4. Phenolic rod

3-64. Why are O-rings sometimes rolled on a cone or dowel?

1. To expose the manufacturer’s identification code
2. To expose and stretch the inner diameter surface for inspection
3. To determine their breaking point
4. To condition them before installation

3-65. What is the first step in replacing an O-ring in a disassembled fluid power system component?

1. Identify the ring's size and material
2. Inspect the ring for cuts, nicks, and flaws
3. Install felt washers on both sides of the ring
4. Lubricate the O-ring groove and all surfaces over which the ring must slide

3-66. What is/are used when the O-ring installation requires spanning or inserting through sharp threaded areas, ridges, slots, and edges?

1. O-ring expanders
2. O-ring entering sleeves
3. A rolling motion of the O-ring
4. A light coating of the threads with MIL-S-8802

3-67. What device is used to prevent O-ring seal extrusion under pressure?

1. Backup ring
2. Cup packing
3. Flange packing
4. Gasket

3-68. Backup rings made from which of the following materials are the most widely used?

1. Cork
2. Leather
3. Tetrafluorethylene (TFE)
4. Bakelite

3-69. What is the age of deterioration of TFE backup rings?

1. 1 year
2. 3 years
3. 5 years
4. TFE does not deteriorate

3-70. When the packing in a fluid power system component is being replaced, the backup washers should be inspected for which of the following conditions?

1. Fray
2. cuts
3. Evidence of compression damage
4. All of the above

3-71. Which of the following statements about a Quad-Ring is false?

1. It can be used at extremely high pressures
2. It provides a seal in only one direction
3. It eliminates the spiral twist sometimes encountered with O-rings
4. It can be used as a static seal as well as a packing for reciprocating or rotary motion

3-72. Which of the following statements is incorrect concerning U-cups and U-packings?

1. They are usually made of different materials
2. They both seal on the OD and the ID
3. They are interchangeable
4. They have cross sections resembling the letter U

3-73. What type of seal is least desirable and is used only where there is not sufficient space for a U-ring packing or a V-ring packing?

1. Cup
2. Flange
3. O-ring
4. Quad-Ring

3-74. How are O-rings stored?

1. They are hung from pegs
2. They are kept under tension
3. They are kept in their original envelopes
4. They are kept in a light, moist atmosphere with a strong draft

3-75. A torn O-ring package is properly secured with which of the following materials?

1. Staples
2. Moistureproof glue
3. Outer covering of moistureproof paper
4. Pressure-sensitive, moistureproof tape